


NUCLEONICA: Mass Activity Calculator

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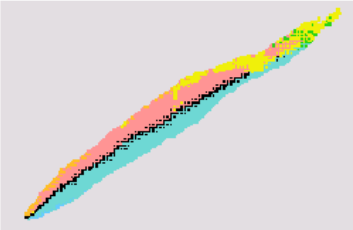
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Nuclear science applications...

 ... web driven nuclear science

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Welcome, Joe
Edit PreferencesAdministration
MyCommunity Portal

> My Last Nuclides

- » 90 Th232
- » 90 Th231
- » 94 Pu239
- » 92 U235
- » 25 Mn52

> My Nuclide Mixtures

- » Pu238+daughter (100g @50y)
- » Natural Uranium
- » Cs137 + Ba137m
- » U232+Co60
- » Transuranics in 1 ton Spent Fuel (4.2% enriched, 50GWd/t, 6 years cooling)

> My Sources

- » Pu239 1 g
- » natu

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- » Open call for JRC Traineeships at the Institute for Transuranium Elements
- » NAML-9 International Conference on Nuclear Analytical Methods in the Life Sciences

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- » Task completed (DecayEngine: Uranium 238)

Example of a simple NUCLEONICA application: The Mass-Activity Calculator

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Co60
10.47 m 5.27 y

Mass Activity Calculator
27 Cobalt

Current Chart: Karlsruhe

Element: Co Mass: 60

Unit: Grams Quantity: 1 **Update**

Unit	Quantity
Grams	1.000
Becquerel	4.187e+13
Curies	1.132e+3
Number of Atoms	1.005e+22
Moles	0.01669
μSv/h (vacuum)	1.411e+7

at 100 cm distance, Threshold energy (γ & X rays) = 15 keV

Help: Mass Activity Calculator

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- 4 Unit Conversion
- 5 Simple Decay and the Decay Constant

Introduction

The mass activity calculator is used to convert between the number of atoms, activity (Bq or Ci) and mass (g) for a specific nuclide.

Co60
10.47 m 5.27 y

Mass Activity Calculator
27 Cobalt








Actual Chart: Karlsruhe

Element: Co Mass: 60

Unit: Grams Quantity: 1 **Update**

Unit	Quantity
Grams	1.0000E+00
Becquerel	4.1871E+13
Curies	1.1317E+03
Number of Atoms	1.0048E+22


Mass Activity Calculator interface showing the Nuclide Selector, Unit/Quantity selector, and the Unit/Quantity Table.

Logged in as: magill  Networking  Nuclear Science  Search  Forum  **Calculator**  Privacy  Legal

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Version: 2009.10.05



Mass Activity Calculator
19 Potassium

Current Chart: Karlsruhe

Element: Mass: Mixture selector

Unit: Quantity:

Unit	Quantity
Grams	1.000
Becquerel	2.617e+5
Curies	7.072e-6
Number of Atoms	1.507e+22
Moles	0.02502
μSv/h (vacuum)	5.285e-3

at cm distance

Nucleonica Scientific Calculator - Windows Internet Explorer

http://www.nucleonica.net/Application/calculator.htm

Select and copy result

0

EXP	1/x	x ²	√x	n	()	OFF	AC
SIN	COS	TAN	LN	7	8	9	÷	
x ³	n!	LOG	LOG2	4	5	6	×	=
e	ASIN	ACOS	ATAN	1	2	3	-	
	CONST	CONV	0	.	±	+		

Internet 100%

Exercises! Mass-Activity Calculator

1. Calculate the specific activities of C-14 and S-35?
2. The activity of Sr-90 is 18,000 transformations per minute. What is the mass of Sr-90?
3. 6 g of carbon from a piece of wood found in an ancient temple is analyzed and found to have an activity of 10 transformations per minute per gram (from C-14). How many atoms of C-14 are present in the sample and what is their mass?
4. The concentration of potassium (K) in humans is about 1.7 g/kg. How much potassium does an average person (weight 80 kg) contain? What is the abundance of K-40 in natural potassium?. What is the mass and activity of K-40 in this person?
5. What is the dose rate from a 100 MBq source of Co-60 at 2m distance?



Exercises! Mass-Activity Calculator

1. Calculate the specific activities of C-14 and S-35? ($1.7\text{E}11$ Bq/g (4.5 Ci/g), $1.6\text{E}15$ Bq/g ($4.3\text{E}4$ Ci/g)).
2. The activity of Sr-90 is 18,000 transformations per minute. What is the mass of Sr-90? (Ans. mass = $5.88\text{E}-11\text{g}$).
3. 6 g of carbon from a piece of wood found in an ancient temple is analyzed and found to have an activity of 10 transformations per minute per gram (from C-14). How many atoms of C-14 are present in the sample and what is their mass? ($2.6\text{E}11$ atoms, mass = $6.0\text{E}-12$ g)
4. The concentration of potassium (K) in humans is about 1.7 g/kg. How much potassium does an average person (weight 80 kg) contain? (136 g). What is the abundance of K-40 in natural potassium?. What is the mass and activity of K-40 in this person? (0.0117%, $1.59\text{E}-2$ g, 4.2 kBq).
5. What is the dose rate from a 100 MBq source of Co-60 at 2m distance? (8.4 $\mu\text{Sv/h}$)

Thanks!



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